

CLAIMS

1. A gas sensor, comprising:
a first electrode and a reference electrode with an electrolyte disposed therebetween, wherein the first electrode and the reference electrode are in ionic communication, wherein the reference electrode has a surface on a side of the reference electrode opposite the electrolyte and the surface has a surface area;
5 and
a reference gas channel in fluid communication with the reference electrode, wherein at least a portion of the surface of the reference electrode physically contacts at least a portion of the reference gas channel, and wherein the
10 portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area.
2. A gas sensor as in Claim 1, wherein the portion of the reference electrode in physical contact with the reference gas channel is less than about 75% of the surface area.
3. A gas sensor as in Claim 2, wherein the portion of the reference electrode in physical contact with the reference gas channel is less than about 50% of the surface area.
4. A gas sensor as in Claim 3, wherein the portion of the reference electrode in physical contact with the reference gas channel is less than about 25% of the surface area.
5. A gas sensor as in Claim 4, wherein the portion of the reference electrode in physical contact with the reference gas channel is less than about 15% of the surface area.
6. A gas sensor as in Claim 1, further comprising a heater disposed in thermal communication with the reference electrode.

7. A gas sensor as in Claim 1, wherein the gas sensor has an impedance below about 4,000 Ω .

8. A gas sensor as in Claim 7, wherein the gas sensor has an impedance below about 3,500 Ω .

9. A gas sensor as in Claim 8, wherein the gas sensor has an impedance below about 3,400 Ω or less.

10. A gas sensor as in Claim 1, wherein a first electrode size is different than a reference electrode size.

11. A gas sensor as in Claim 10, wherein the first electrode size is smaller than the reference electrode size.

12. A method for forming a gas sensor, comprising:
disposing an outer electrode and a reference electrode on opposite sides of an electrolyte such that the outer electrode and the reference electrode are in ionic communication, wherein the reference electrode has a surface on a side of
5 the reference electrode opposite the electrolyte;
disposing at least a portion of a fugitive material in physical contact with a portion of the reference electrode surface, wherein the reference electrode has a surface area and the portion of the reference electrode surface in physical contact with the fugitive material is less than about 90% of the surface
10 area;
disposing a heater on a side of the fugitive material opposite the reference electrode to form a green sensor; and
co-firing the green sensor.

13. A method for forming a gas sensor as in Claim 12, wherein the portion of the reference electrode surface in physical contact with the fugitive material is less than about 75% of the surface area.

14. A method for forming a gas sensor as in Claim 13, wherein the portion of the reference electrode surface in physical contact with the fugitive material is less than about 50% of the surface area.

15. A method for forming a gas sensor as in Claim 14, wherein the portion of the reference electrode surface in physical contact with the fugitive material is less than about 25% of the surface area.

16. A method for forming a gas sensor as in Claim 15, wherein the portion of the reference electrode surface in physical contact with the fugitive material is less than about 15% of the surface area.

17. A method for forming a gas sensor as in Claim 12, wherein the gas sensor has an impedance below about 4,000 Ω .

18. A method for forming a gas sensor as in Claim 17, wherein the gas sensor has an impedance below about 3,500 Ω .

19. A method for forming a gas sensor as in Claim 18, wherein the gas sensor has an impedance below about 3,400 Ω or less.

20. A method for forming a gas sensor as in Claim 12, wherein the first electrode and the reference electrode are of different sizes.